

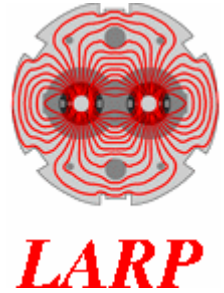


LHC@FNAL: Remote Operations for LHC

**E. Harms
28 March 2006**



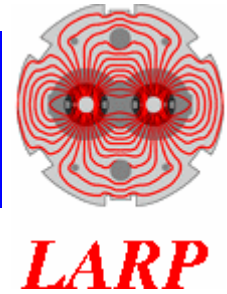
LHC@FNAL - LARP



- Introduction to LARP
- LARP needs for Remote Access
- LHC@FNAL plans



LHC@FNAL - LARP

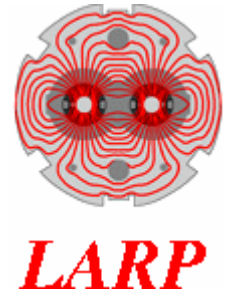


LARP Mission Statement

The US LHC Accelerator Research Program enables U.S. accelerator specialists to take an active and important role in the LHC accelerator during its commissioning and operations, and to be a major collaborator in LHC performance upgrades. In particular, LARP will support U.S. institutions in LHC commissioning activities and accelerator science, accelerator instrumentation and diagnostics, and superconducting magnet R&D to help bring the LHC on and up to luminosity quickly, to help establish robust operation, and to improve and upgrade LHC performance. Furthermore, the work we do will be at the technological frontier and will thereby improve the capabilities of the U.S. accelerator community in accelerator science and technology to more effectively operate our domestic accelerators and to position the U.S. to be able to lead in the development of the next generation of high-energy colliders.



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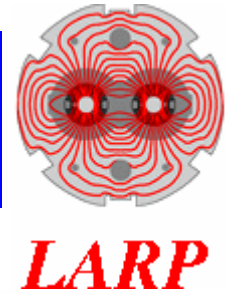


LARP GOALS

- **Advance International Cooperation in High Energy Accelerators**
- **Advance High Energy Physics**
 - Help bring the LHC on and up to design performance quickly
 - Improve LHC performance by advances in accelerator understanding and instrumentation
 - Use LHC as a tool to gain deeper knowledge of accelerator science and technology
 - Extend LHC as a frontier HEP instrument with a timely luminosity upgrade
- **Advance U.S. Accelerator Science and Technology**
 - Keep skills sharp by helping to commission the LHC
 - Conduct forefront Accelerator Physics research and development
 - Advance U.S. capabilities to improve the performance of our own machines
 - Prepare U.S. scientists to design next generation colliders
 - Develop technologies necessary for next generation colliders

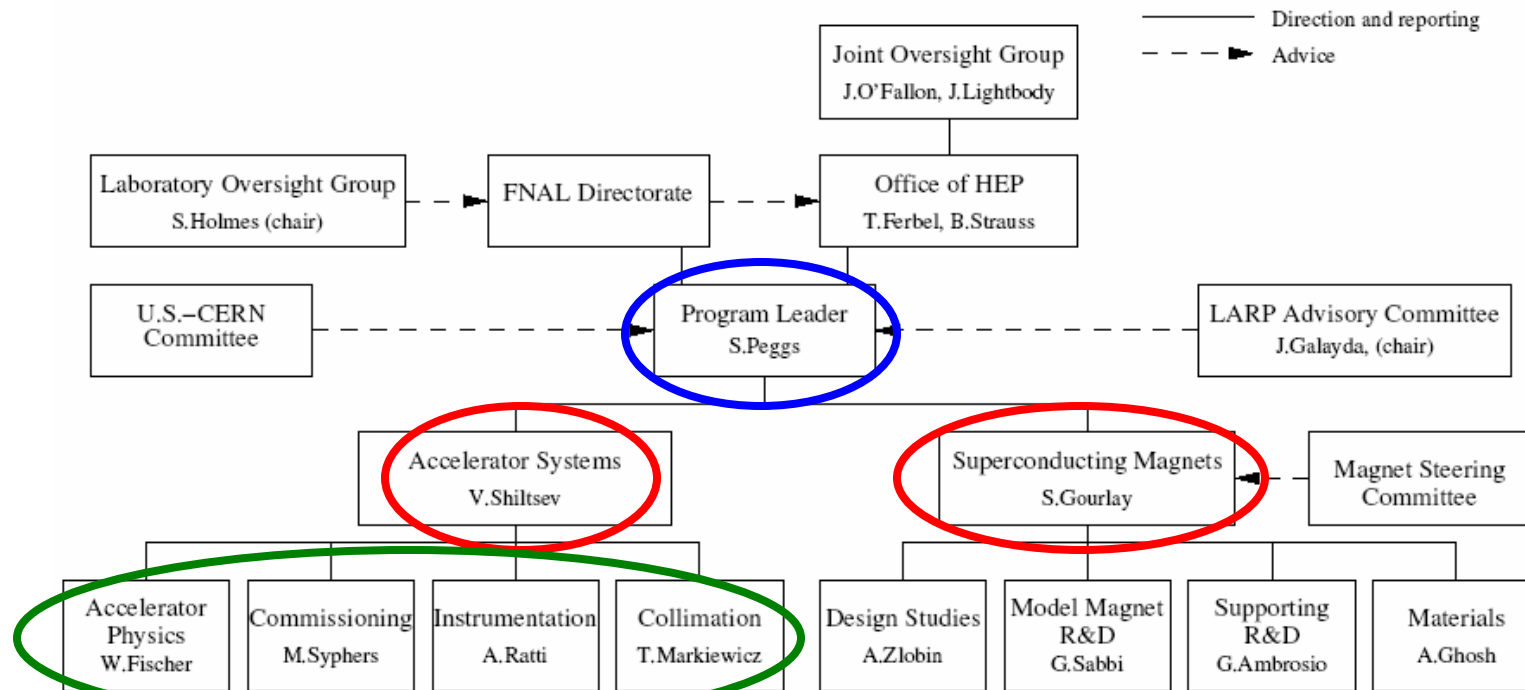


LHC@FNAL - LARP



US LHC Accelerator Research Program (LARP) Organization Chart

January 5, 2006



LARPAC: J.Galayda (chair), A.Chao, A.Devred, J.Minervini, C.Rode, A.Seryi, K.Wittenburg, A.Yamamoto

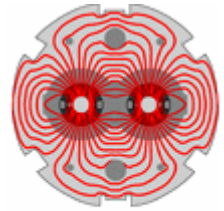
LOG: S.Holmes (chair), P.Drell, S.Ozaki, J.Siegrist

MSC: S.Gourlay, G.Ambrosio, A.Ghosh, M.Lamm, G.Sabbi, P.Wanderer, A.Zlobin

US-CERN Comm: L.Evans, R.Assmann, R.Bailey, P.Bryant, P.Lebrun, R.Ostojic, L.Rossi, F.Ruggiero, R.Saban, H.Schmickler, S.Holmes, S.Gourlay, M.Harrison, J.Kerby, P.Limon, S.Peggs, T.Raubenheimer, V.Shiltsev, J.Siegrist, V.Yarba



LHC@FNAL – LARP needs



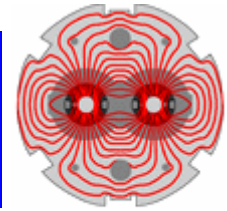
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LARP Accelerator Systems Tasks

- **Commissioning**
 - Hardware
 - Beam
- **Instrumentation (deliverables)**
 - Schottky
 - Luminosity
 - PLL/BBQ
- **Accelerator Physics**
- **Design of future IR's**



LHC@FNAL - LARP/LHC Requirements



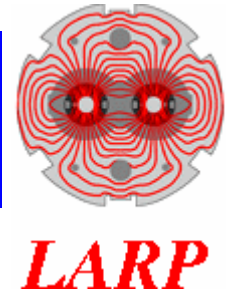
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Four broad categories of Requirements – requirements scale up as scope of activity changes

- **Overarching (defined as ‘to extend over or throughout’)**
 - Confidentiality
 - Space
- **Hardware Commissioning**
 - Access to data as U.S. hardware – magnets and instrumentation - is installed and commissioned
 - Link to Field Control rooms in LHC tunnel
- **Beam Commissioning**
 - More activity in CCC
 - Software development
 - Sector test
 - First beam
- **Post-LHC commissioning activities**
 - Support of LARP deliverables
 - Beam studies
 - LHC upgrades



LHC@FNAL – LARP/LHC needs



Model the CCC at CERN

- speed assimilation prior to stays at CERN
- ease in remote participation in studies
- 'service after the sale'



FESS - Scope



PROJECT SCOPE

LHC@FNAL Upgrades

This project incorporates conventional construction methods to provide the spatial and infrastructure requirements for the Operation Center equipment.

The civil construction portion of the project incorporates conventional construction methods to provide the spatial requirements for the operations center equipment, consoles and related equipment.

Detailed descriptions of the individual components are listed below.

Architectural

The architectural upgrades will improve the finishes of the existing spaces as required to accommodate the intended uses. This includes the rework of the existing ceiling including the installation of a soffit that will house the video projectors and HVAC ductwork.

A portion of the existing irregular paver floor will be removed and replaced with a improved sub-base and carpet in those areas where the chairs will be located.

The existing south wall of the OC will be upgraded to improve the sound characteristics of the assembly to better isolate the space from the adjacent Cafeteria functions.

A "mullionless" glass storefront system will be installed to separate the OC from the Atrium. This system, similar in appearance and finish to existing installations in Wilson Hall, will allow a visual connection between the spaces.



FESS - Scope



Mechanical

The existing space is served by the Wilson Hall Heating Ventilation and Air Conditioning (HVAC) system. The existing system is adequate to handle the expected loads from the OC. In addition, the Wilson Hall HVAC system is programmed to accommodate normal occupant loads and is operated in setback mode during off hours. The 24 hour a day use of the OC combined with the requirement for additional cooling dictate the requirements for the HVAC performance of the space.

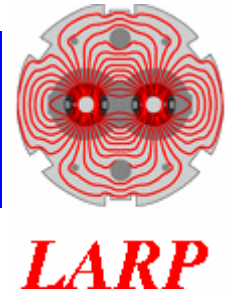
This project will install additional HVAC unit to serve the OC. This project will install an additional unit to provide the environmental functions (cooling, reheat, dehumidification, humidification, and filtration). A "split system" unit will be installed. These units split the refrigeration components between the room unit and a condensing unit. This locates the compressor and condenser at a remote location, and reduces noise levels within the room unit. The remote unit for this project will be an air-cooled indoor unit and will be located on the ground floor of Wilson Hall. It will be vented to the outside through louvers that will replace the existing glass windows.

The existing ductwork in the space will be reworked to accommodate the new function and will be designed to reduce noise associated with the distribution system.

The existing sprinkler system will be modified and extended as required to accommodate the new functions.



FESS - Scope



Electrical

Electrical utilities for this project will be extended from the existing panelboards located on the ground floor and Atrium level of Wilson Hall. The extension includes the installation of a new electrical panelboard dedicated to the OC and VCC functions.

In order to accommodate the planned operators consoles and related equipment in the OC, this project will install empty conduits for audio, visual and data sources to the expected locations of these devices.

The lighting in the OC will be upgraded to accommodate the computer intensive functions.

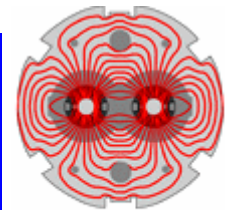
The project will install electrical power to the location of the planned video projector in the VCC as well as associated empty conduits for audio, visual and data sources

Task lighting for console operations will be supplemented with recessed lighting fixtures in the ceiling soffit. Room lighting will be dimmable.

Code required emergency lighting and exit lighting will be provided.



FESS - Budget



LARP

FERMILAB - FESS/E CONSTRUCTION COST ESTIMATE

Project Title:		Project No.	Status:	Date:	Revision Date:
LHC@FNAL Upgrades		2-1-319	CDR	3-Mar-06	
ITEM NO.	DESCRIPTION OF WORK:	QUANTITY	UNITS	UNIT COST	AMOUNT
01	PREP/DEMO				\$25,400
01	Mobilize	1	Lot	\$1,000.00	\$1,000.00
02	Relocate Displays In Work Area (2 men x 4 days)	64	Hours	\$65.00	\$4,200.00
03	Disconnect Electrical (2 men x 1 day)	16	Hours	\$75.00	\$1,200.00
04	Remove Existing Track Lighting (2 men x 3 days)	48	Each	\$75.00	\$3,600.00
05	Remove Existing Pavers/Sawcut	200	SF	\$12.00	\$2,400.00
06	Demo Existing Ceiling	1300	SF	\$4.00	\$5,200.00
07	Clear Space on VHGIF	1	Lot	\$1,500.00	\$1,500.00
08	Core Drills for Electric/Mechanical	1	Lot	\$3,000.00	\$3,000.00
08	Dumpsters	5	Each	\$660.00	\$3,300.00
02	ARCHITECTURAL				\$86,300
01	Floor Leveling	200	SF	\$8.00	\$1,600.00
02	Carpet	200	SY	\$36.00	\$7,200.00
03	Construct Soffit	1	Lot	\$8,000.00	\$8,000.00
04	Rework Ceiling	1300	SF	\$9.50	\$12,400.00
05	Install Windows in Existing 1-East South Wall	40	SF	\$85.00	\$3,400.00
06	Aluminum/Glass Storefront at Atrium	320	SF	\$110.00	\$35,200.00
07	Aluminum/Glass Door	1	Each	\$3,000.00	\$3,000.00
08	Soundwall at Café	450	SF	\$20.00	\$9,000.00
09	Piping Chase	1	Lot	\$2,000.00	\$2,000.00
10	Patch/Prep/Paint Existing Walls	1	Lot	\$3,000.00	\$3,000.00
11	Misc Patching	1	Lot	\$1,500.00	\$1,500.00
					\$0.00
03	MECHANICAL				\$80,000
01	Mini-Mate Ceiling Unit (5-Ton)	2	Each	\$12,000.00	\$24,000.00
02	Condenser Unit	2	Each	\$5,000.00	\$10,000.00
03	Piping	2	Each	\$5,000.00	\$12,000.00
04	Condenser Unit Louvers	2	Each	\$2,500.00	\$5,000.00
05	Condenser Unit Enclosures	2	Each	\$1,000.00	\$2,000.00
06	Rework Supply Air Ductwork	1	Lot	\$3,000.00	\$3,000.00
07	Rework Return Air Ductwork	1	Lot	\$3,000.00	\$3,000.00
08	Soffitt Diffusers	1	Lot	\$8,000.00	\$8,000.00
09	Sprinkler Mods	1300	SF	\$10.00	\$13,000.00
					\$0.00

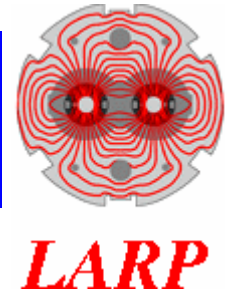
FERMILAB - FESS/E CONSTRUCTION COST ESTIMATE

Project Title:		Project No.	Status:	Date:	Revision Date:
LHC@FNAL Upgrades		2-1-319	CDR	3-Mar-06	
ITEM NO.	DESCRIPTION OF WORK:	QUANTITY	UNITS	UNIT COST	AMOUNT
04	ELECTRICAL				\$62,500
01	Electrical Tie In at Existing Switchboard	1	Lot	\$8,000.00	\$8,000.00
02	New 42 Circuit Panelboard	1	Each	\$10,000.00	\$10,000.00
03	Lighting In Soffit	25	Each	\$300.00	\$7,500.00
04	Exit/Emergency Lighting	2	Each	\$500.00	\$1,000.00
05	Electrical Rough-ins for Consoles	8	Each	\$2,000.00	\$16,000.00
06	Electrical Rough-ins for Projectors	4	Each	\$2,000.00	\$8,000.00
07	Electrical Rough-ins for Video Conference Room	2	Each	\$2,000.00	\$4,000.00
08	Electrical for Mechanical Equipment	4	Each	\$2,000.00	\$8,000.00
	SUBTOTAL:			\$254,200	
	DIFFICULT CONDITIONS PREMIUM 20%			\$51,000	
	OVERHEAD & PROFIT @ 10%			\$31,000	
	EXPECTED SUBCONTRACTED PRICE			\$336,000	

\$600K in total earmarked



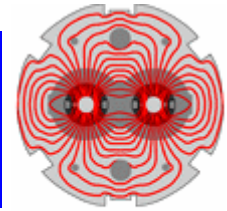
Current status



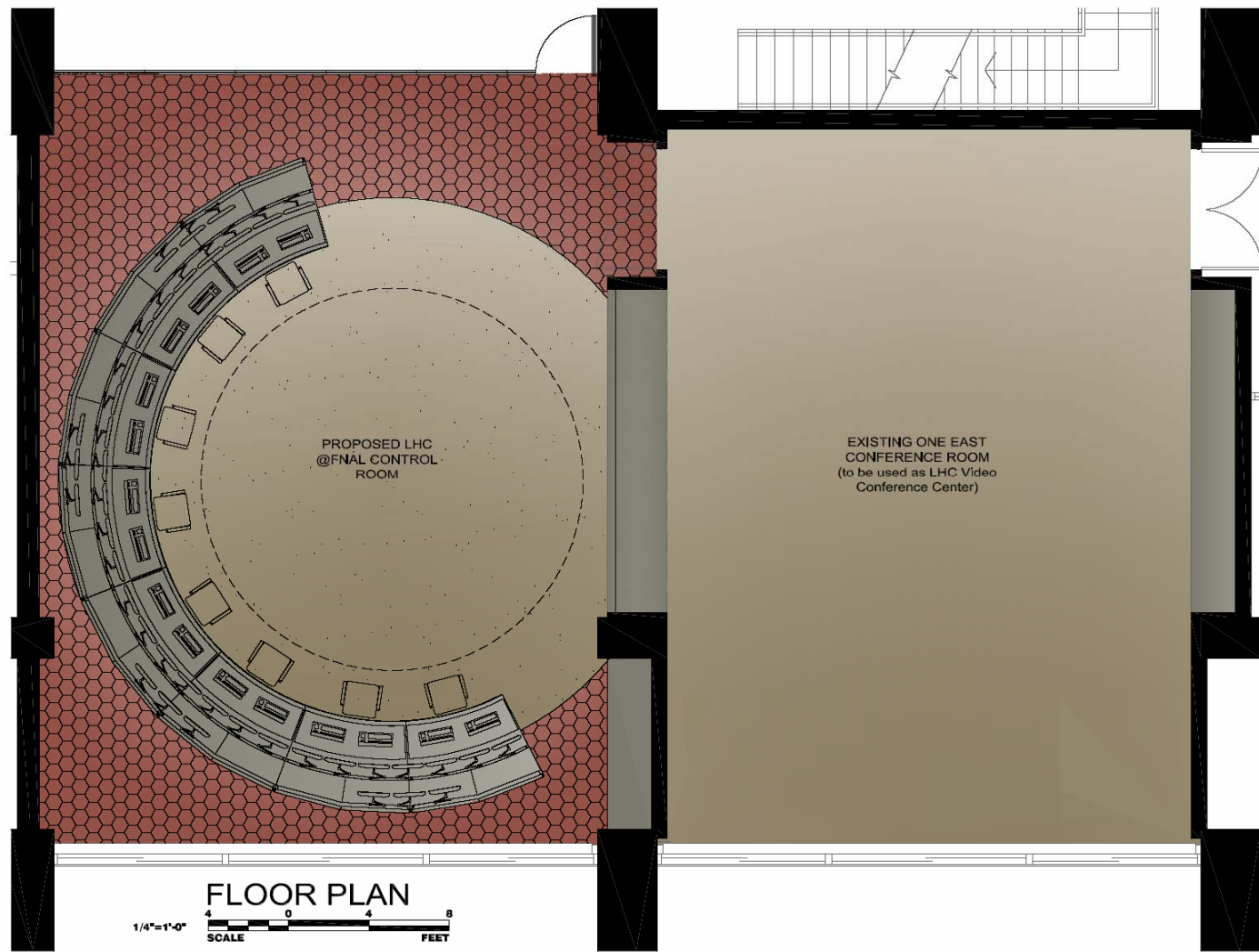
- Space Identified
- Layout endorsed by Pier/CMS/AD
- GPP money 'reserved'
- Conceptual Design Report complete/review largely done
 - Minimal comments
- Project Execution Plan written
- Project Managers
 - Elvin Harms/AD – construction
 - Erik Gottschalk/PPD – consoles
- Weekly meetings to prepare construction drawings
 - Networking needs being incorporated
- Presentation to LARP at its collaboration meeting in late April
- Begin work in spring/summer
- Construction complete by end of FY06



LHC@FNAL – Floor plan

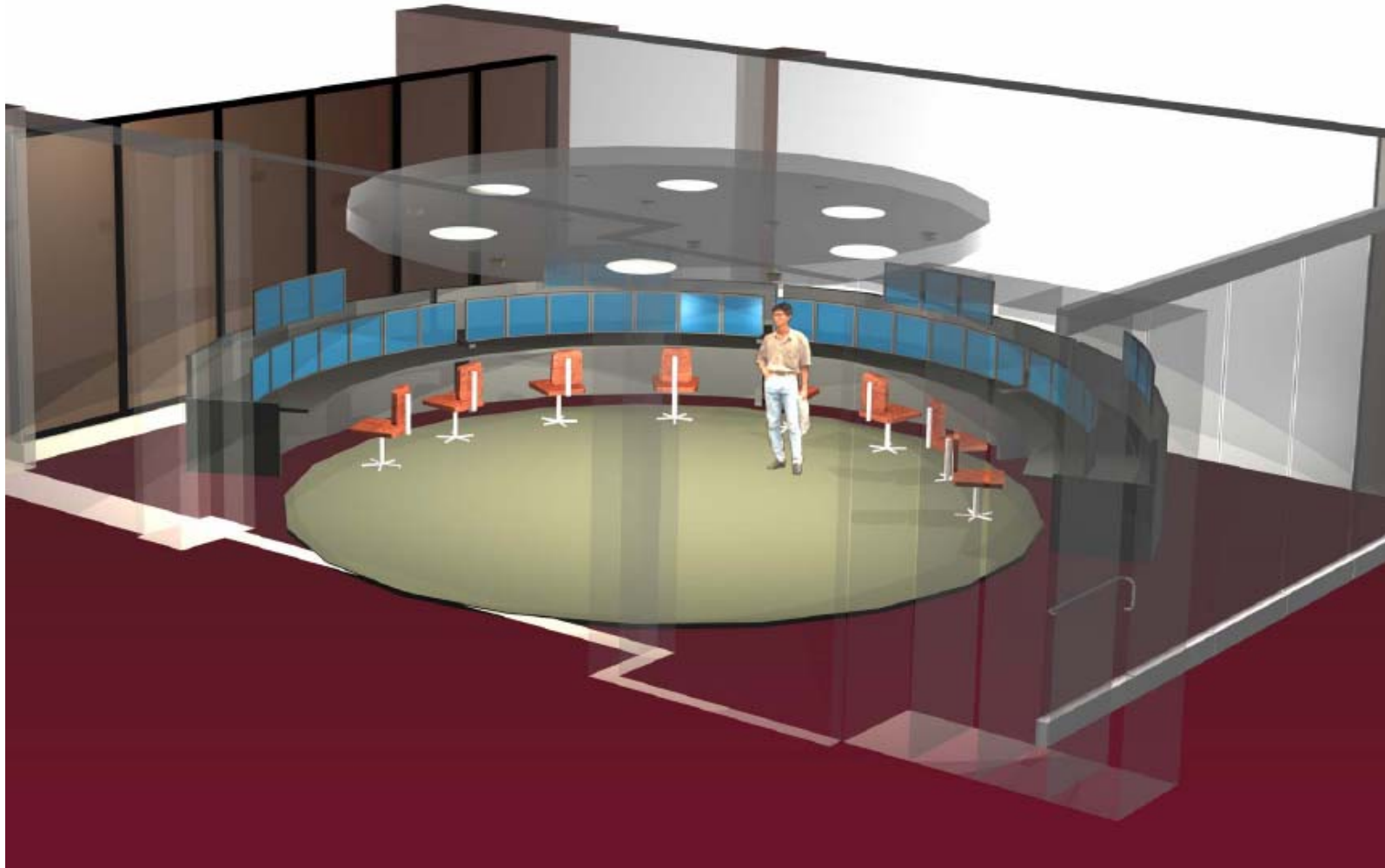
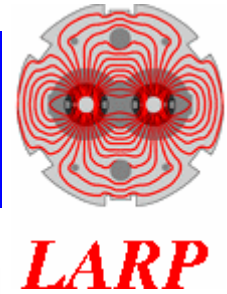


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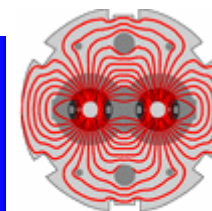


LHC@FNAL – Isometric view

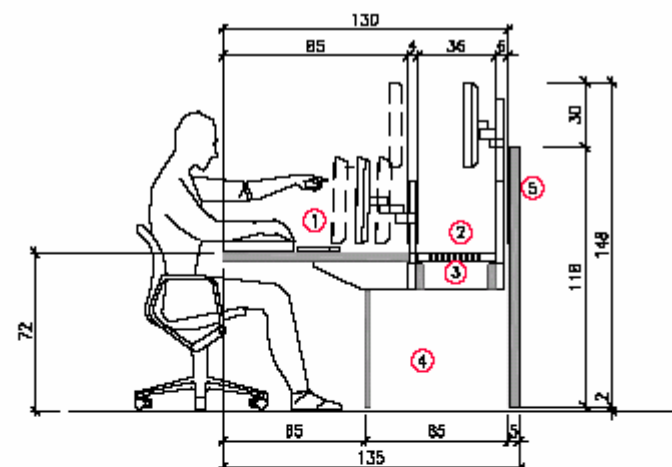
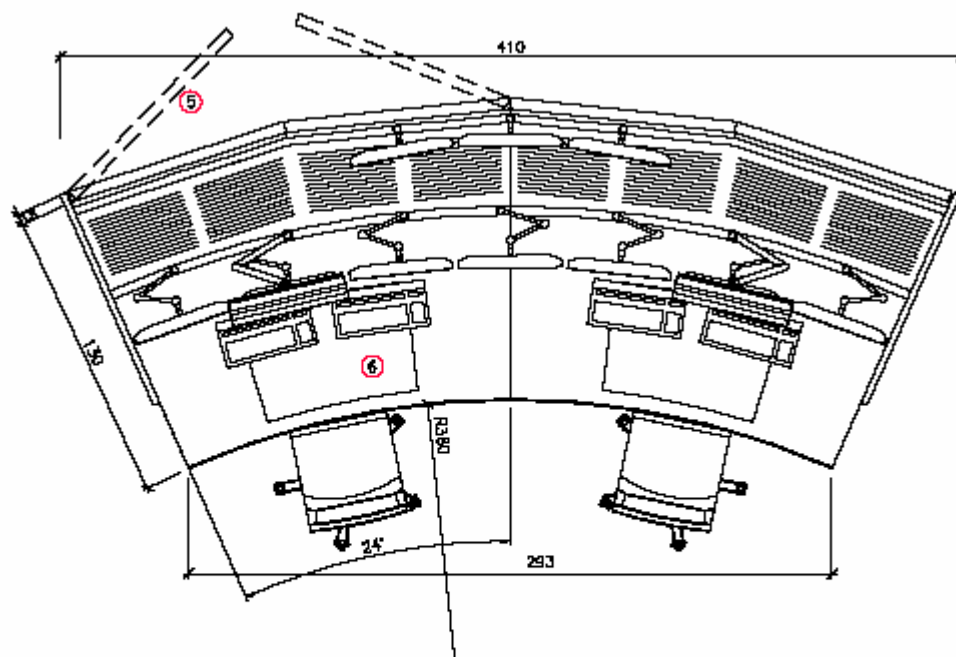




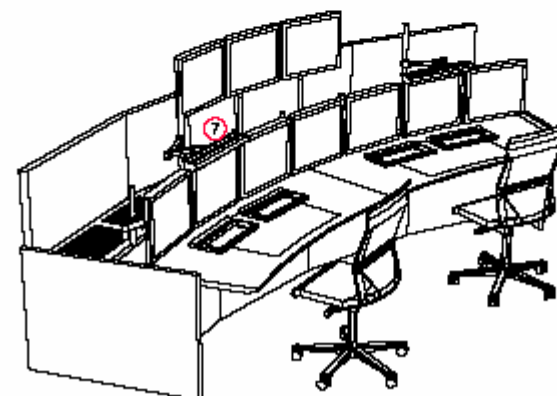
LHC@FNAL – Consoles



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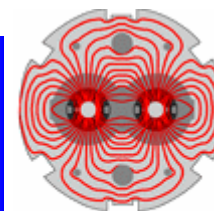


- ① Work top
- ② Monitor top
- ③ Cable channel
- ④ Installation room
- ⑤ Acoustic screen doors
- ⑥ Insert
- ⑦ Light-top





LHC@FNAL – view from Atrium

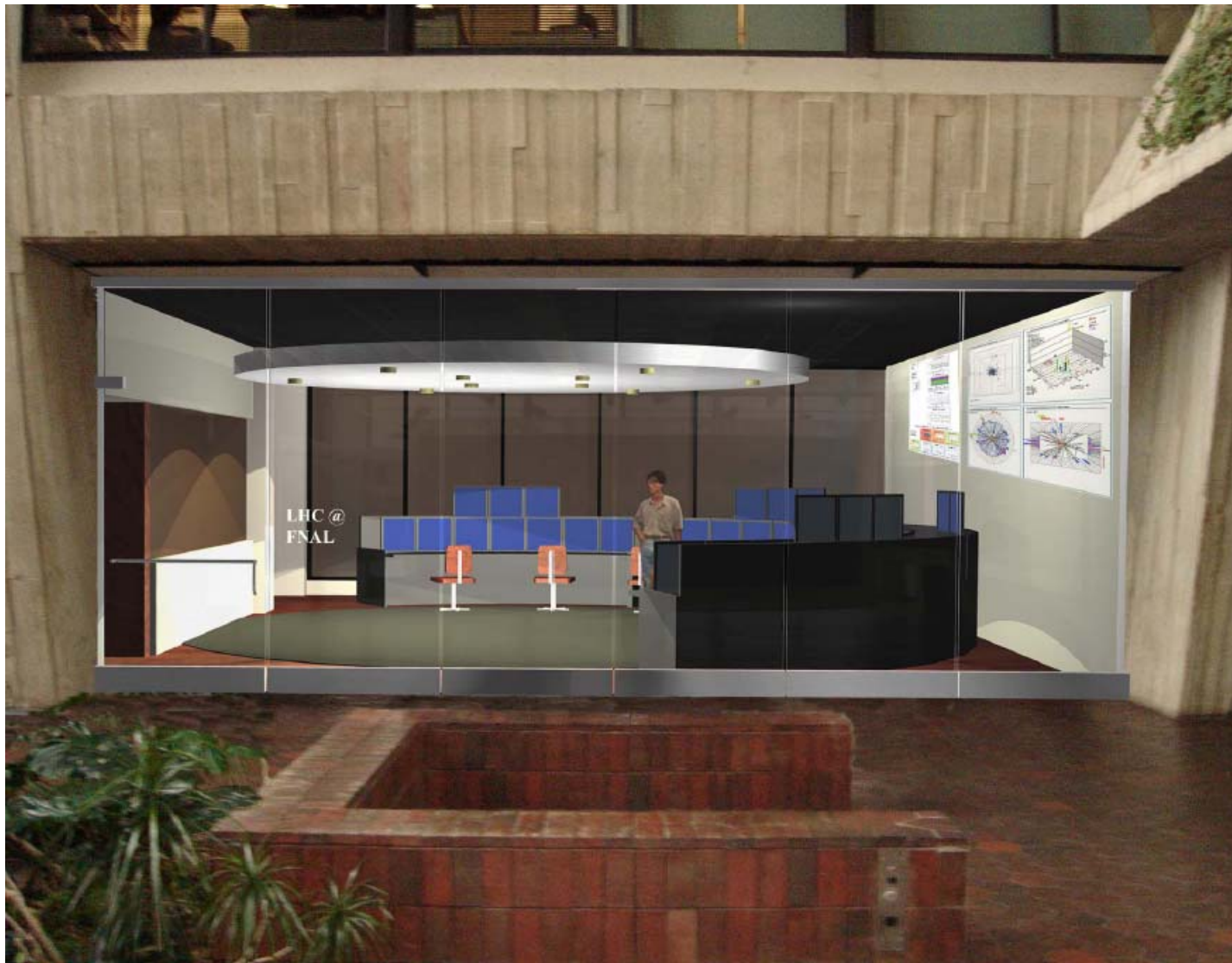
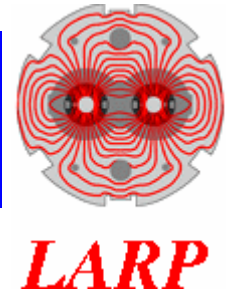


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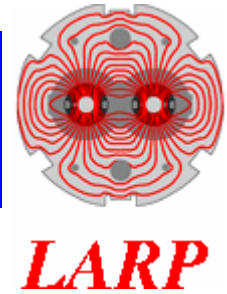


LHC@FNAL – Wall display



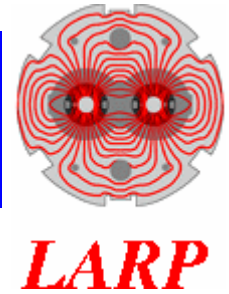


LHC@FNAL – Window display





Summary



- LHC@FNAL has benefits for LARP
- Intimately tied to CCC design
- Project design well on its way
- Time for feedback is now!
 - Refer to Erik's list of contacts